D1ACH2503 **(2 Pages)** **Name.....**
Reg.No.....

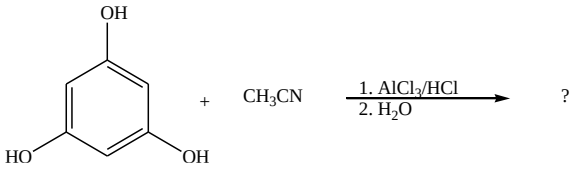
FIRST SEMESTER M.Sc. DEGREE EXAMINATION, NOVEMBER 2025
(Regular/Improvement/Supplementary)

CHEMISTRY
FCHE1C03- STRUCTURE AND REACTIVITY OF ORGANIC COMPOUNDS

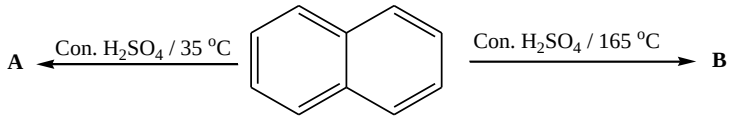
Time: 3 Hours **Maximum Weightage: 30**

Section A: Short answer questions. Answer *any eight* questions. Each carries 1 weightage.

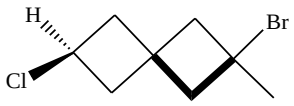
1. What is the product of this reaction? Explain.



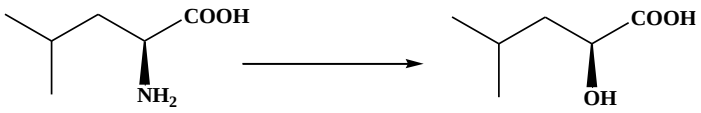
2. Find the products A & B of the following reaction.



3. Draw the *erythro* and *threo* isomers of chlorohydrins and comment on their stability.
4. Discuss the conformations of 2-bromocyclohexanone.
5. Find the configuration of the compound:



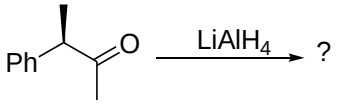
6. Distinguish between diastereotopic and enantiotopic hydrogens.
7. Assign *R* and *S* to asymmetric carbon(s) in *L*-glyceraldehyde and *L*-threose.
8. Discuss how the following reaction can be carried out.



9. Draw and explain the most stable conformation of *cis*-1-*tert*-butyl-4-methylcyclohexane.
10. Write a brief note on stereoisomerism of aldoxime.
11. Discuss how stereochemical resolution can be achieved through inclusion compounds.

(P.T.O.)

12. Indicating stereochemistry, predict the product the following reaction.



(8 x 1 = 8 weightage)

Section B: Short essay questions. Answer *any four* questions. Each carries 3 weightage.

13. Discuss the nucleophilic substitution reaction mechanism of aromatic diazonium salts:

    i) in the presence of copper salts; ii) in the absence of copper salts.

14. Discuss how primary and secondary kinetic isotopic effects are useful in organic reaction mechanism with suitable examples.
15. Explain the different conformations of tartaric acid.
16. Which conformer of cyclohexane-1,3-dicarboxylic acid will yield anhydride easily? Why?
17. Illustrating conformations, explain semipinacolic deamination of α-amino alcohols.
18. Emphasizing mechanisms, demonstrate bromination of 2-butene is an example of stereospecific reactions and bromination of cyclohexene is an example of stereoselective reactions.
19. Giving mechanism, explain the synthetic importance of Sharpless asymmetric epoxidation reaction?

(4 x 3 = 12 weightage)

Section C: Essay questions. Answer *any two* questions. Each carries 5 weightage.

20. Using conformational arguments compare and explain the course and rate of reactions in:
    i) Esterification of methanol, isomenthol, neomenthol, and neoisomenthol.
    ii) Eliminations of *cis*- and *trans*- isomers of 4-*t*-butylcyclohexyltosylate and phenylcyclohexanol.
21. Discuss in detail the diastereofacial selectivity in the Aldol addition reaction using Zimmerman-Traxler model.
22. What are annulenes? Discuss aromaticity of:

    a) [8]-, [10]- and [14]- annulenes; b) Azulenes, fulvenes, fulvalenes and pentalenes.

23. What are linear free energy relationships? Giving the significance of Hammett parameters, derive Hammett linear free energy relationship.

(2 x 5 = 10 weightage)